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(58) Field of search

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(54) Composite article

(57) A composite article useful for decorating walls and coating the interior of transport means such as cars and boats, comprises an outer layer of a microfibrus, non-woven fabric, and an inner layer of a foamed plastic material. The microfibrus non-woven material may be a material consisting of microfibrus of a polyester or a polyamide in a polyurethane matrix. A waterproofing may be connected to the layer of foamed material. The composite article may comprise in the following orders, layers of (1) (a) microfibrus non-woven material (b) foamed plastic material (c) cloth, of (2) (a) microfibrus non-woven material (b) foamed plastic material and (c) knitted fabric of (3) (a) microfibrus non-woven material (b) knitted fabric (c) foamed plastic material and (d) knitted fabric, (4) (a) microfibrus non-woven material (b) cloth, (c) foamed plastic material and (d) cloth and (5) (a) microfibrus non-woven material (b) cloth (c) foamed plastic material and (d) knitted fabric.

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"COMPOSITE ARTICLE"

The present invention relates to a composite article comprising a layer of a microfibrinous, non-woven material, useful in the field of interior decoration and of coating.

5 Microfibrinous, non-woven materials, constituted by polyester or polyamide microfibres, e.g., microfibres of nylon-6, in a polyurethane matrix, are known in the art. Among these materials, the one formed by poly-(ethylene terephthalate) microfibres in a polyurethane matrix  
10 constitutes a valuable, widely used, product, used in particular in garment industry, thanks to its excellent characteristics of appearance, pleasant hand, light-weight, velours and to its fastness to light and to nitrogen oxides in the atmosphere.

15           According to the instant finding, such microfibrinous,  
non-woven materials are coupled with a layer of a foamed  
plastic material in order to supply novel composite  
materials in which an extremely good aesthetical  
appearance is combined with characteristics which render  
20   the same composite materials suitable for use in the  
sector of interior decoration, and in the sector of  
coating.

In accordance therewith, the present invention relates to a composite article particularly useful for decorating walls and for coating the interior of transport means, such as cars and boats, which comprises an outer layer of a microfibrinous, non-woven fabric, and an inner layer of a foamed plastic material.

In the instant invention, by the term "microfibres" those fibres are meant which have a count comprised within the range of from 0.01 deniers to 0.40 deniers, and preferably of the order of from 0.08 to 0.15 deniers.

5       The microfibrinous, non-woven material formed by microfibres of poly-(ethylene terephthalate) in polyurethane can be obtained by means of a process generally comprising the following steps:

- 10       \* a non-woven fabric made from microfibres of poly-(ethylene terephthalate) is impregnated with a polyurethanic elastomer;
- \* said polyurethanic elastomer is coagulated in order to form a composite, microfibrinous sheet;
- \* said composite, microfibrinous sheet is ground in order
- 15       to form a raw, microfibrinous, non-woven fabric; and
- \* said raw, microfibrinous, non-woven fabric is dyed in order to produce a dyed end product.

      The non-woven fabric of microfibres of poly-(ethylene terephthalate) can be obtained in its turn from

20       a raw felt of staple fibre, constituted by microfibres of poly-(ethylene terephthalate) in a polystyrene matrix, with said raw felt being submitted to needling in order to produce a needled felt, with said needled felt being

      treated first with an aqueous solution of polyvinyl

25       alcohol and then with perchloroethylene, so as to dissolve the polystyrene matrix and recover the non-woven fabric of microfibres of poly-(ethylene terephthalate).

      The microfibrinous, non-woven material obtained in that way shows excellent characteristics of appearance,

30       hand, light-weight, velours, fastness to light and to nitrogen oxides in the atmosphere.

In particular, such a non-woven, microfibrous material displays characteristics generally falling inside the following range of values:

- \* thickness (ASTM D-1910) : from 0.6 to 0.9 mm
- 5 \* weight per unit surface area : from 170 to 250 g/m<sup>2</sup>
- \* tenacity (ASTM D-1682)
  - longitudinal : from 5.0 to 9.0 kg/cm
  - transversal : from 3.0 to 6.0 kg/cm
- \* elongation at breakage
  - 10 (ASTM D-1682)
    - longitudinal : from 65 to 80%
    - transversal : from 110 to 130%
- \* tearing strength according to Elmendorf
  - 15 longitudinal : from 2.3 to 1.5 kg
  - transversal : from 1.3 to 0.7 kg
- \* fastness to light (80 SHF; grays scale; AATCC 16A 1964) : from 6 to 7
- \* fastness to atmospheric nitrogen
  - 20 oxides (1 cycle; AATCC 23 1975) : from 3 to 5

According to the present invention, such a microfibrous, non-woven material, or similar microfibrous, non-woven materials, is(are) coupled with a layer of a foamed plastic material in order to produce novel materials, useful in the above set forth sectors.

More particularly, according to a form of practical embodiment of the present invention, the microfibrous, non-woven material is coupled with a foamed plastic material by means of a flame treatment, or by means of the interposition of a bonding agent.

The foamed plastic materials useful for the intended

purpose can be selected from within a wide class of materials, such as, e.g., polyurethanes, polyethers, polyolefins and polystyrene. As a general rule, the thickness of the layer of the foamed material can be comprised within the range of from 2 to 10 mm, and the foamed material may be endowed with flame-retardant characteristics, it may be heat-welding, or it may be or may be not provided with an adhesive layer, whether desired or necessary, as a function of the particular use it is intended for. The so obtained composite articles are suitable for decorating walls, or for coating the interior of transport means, e.g., for coating the inner surfaces of the decks of cars, and the surfaces of boat interiors. In these applications, the articles according to the present invention display very good deadening properties, touch and pleasant hand characteristics.

According to another form of practical embodiment of the present invention, on the back face of the microfibrous, non-woven material a polyurethane emulsion is spread by means of a doctor, in order to manufacture rigid composite articles. According to a further technique, a polyurethane foam is flame-coupled with a layer of a microfibrous, non-woven material and with a waterproofing film, in order to obtain soft composite articles, in which the thickness of the polyurethane layer is of the order of from 2 to 8 mm. In any case, the obtained articles are suitable for coating the inner walls of interiors of cars, such as decks, doors and dashboards.

According to still another form of practical embodiment, the microfibrous, non-woven material is

coupled with a cloth by means of the "multidot" system,  
and the so obtained product is flame-coupled with a  
polyurethane foam, with a thickness comprised within the  
range of from 2 to 10 mm, and then with a light knitted  
5 cloth. Also in this case, composite articles are  
obtained, which are useful for inner coatings for cars.

Still other examples of composite articles,  
according to the present invention, are constituted by:

- \* microfibrinous, non-woven material / foamed plastic  
10 material / cloth;
- \* microfibrinous, non-woven material / foamed plastic  
material / light knitted fabric;
- \* microfibrinous, non-woven material / light knitted fabric  
/ foamed plastic material / light knitted fabric; and
- 15 \* microfibrinous, non-woven material / cloth / foamed  
plastic material / cloth.

The cloths can be made from cotton, polyester, nylon  
fibres or blended fibres, and one or more component(s) of  
the composite material can be endowed with flame-  
20 retarding characteristics. Furthermore, the microfibrinous,  
non-woven material can be perforated, sewn, shorn,  
printed or embossed.

In the following experimental examples, as the  
microfibrinous, non-woven material the product available  
25 from the market is used, which is traded under the name  
MASTER-COVER (registered mark) by the company ALCANTARA,  
and has the following characteristics:

- \* thickness : from 0.6 to 0.9 mm
- \* weight per unit surface area : from 170 to 230 g/m<sup>2</sup>
- 30 \* tenacity
- Longitudinal : from 5.0 to 9.0 kg/cm

|   |                               |                         |
|---|-------------------------------|-------------------------|
|   | transversal                   | : from 3.0 to 6.0 kg/cm |
|   | * elongation                  |                         |
|   | longitudinal                  | : from 65 to 80%        |
|   | transversal                   | : from 110 to 130%      |
| 5 | * fastness to light           | : from 6 to 7           |
|   | * fastness to nitrogen oxides | : from 3 to 5           |

Furthermore, such a synthetic microfibrous product shows a nice appearance, a thick and natural velours and a fault-free dyeing ability.

#### 10 Example\_1

In a first test, the microfibrous, non-woven material having the characteristics reported in the disclosure is flame-coupled with a layer of a foamed polyurethane, of 3 to 6 mm of thickness. In a second  
15 test, on the back face of the microfibrous, non-woven material a bonding agent is spread by means of a doctor, the material is coupled with a layer of foamed polyurethane of the above detailed type, and the so obtained composite material is made pass through a  
20 calender and then is dried in an air-oven. In both cases, a composite article is obtained, which has a nice appearance, shows deadening properties, touch and a pleasant hand. It is particularly useful for decorating walls, and for coating the interior of transport means,  
25 in particular of boats.

#### Example\_2

In a first test, on the back face of the microfibrous, non-woven material a polyurethane emulsion is spread by means of a three-heads spreading machine, so  
30 as to form a film of from 30 to 80 g/m<sup>2</sup>. In a second test, a polyurethane foam of from 3 to 6 mm and with a

density of 28-50 kg/m<sup>3</sup> is flame coupled: on one face, with the microfibrinous, non-woven material, and on the other face with an waterproofing polyurethane film. In that way, composite articles are obtained, which are useful in the production of respectively rigid and soft components suitable for coating the interior of cars.

### Example\_3

The microfibrinous, non-woven material is coupled by means of the multidot system with a mixed cotton-polyester cloth. This composite material is then processed on a double-head flame-coupling machine. During the passage on the first head, said material is coupled with a polyurethane foam having a thickness of 3-6 mm and a density of 24-50 kg/m<sup>3</sup>, and on the second head it is flame-coupled with a light knitted fabric of poly-(ethylene terephthalate) endowed with elastic properties along both longitudinal and transversal directions (i.e., a bi-elastic knitted fabric). The composite material can be used for applications similar to those as of Example 2.



CLAIMS

1. A composite article comprising an inner layer of a foamed material and an outer layer of a microfibrous non-woven material.
- 5 2. A composite article according to claim 1, wherein the microfibrous non-woven material comprises polyester microfibres or polyamide microfibres in a polyurethane matrix.
3. A composite article according to claim 2,  
10 wherein the polyester microfibres are poly(ethylene terephthalate) microfibres.
4. A composite article according to claim 2, wherein the polyamide microfibres are nylon-6 microfibres.
- 15 5. A composite article according to any of claims 1 to 4, wherein the foamed material is a polyurethane foam, a polyether foam, a polyolefin foam or a polystyrene foam.
6. A composite article according to any of  
20 claims 1 to 5, further comprising a waterproofing film connected to the layer of foamed material.
7. A composite article according to claim 1, comprising layers of (a) microfibrous non-woven material, (b) foamed plastic material and (c) cloth, in  
25 the order given.
8. A composite article according to claim 1, comprising layers of (a) microfibrous non-woven material, (b) foamed plastic material and (c) knitted fabric, in the order given.
- 30 9. A composite article according to claim 1, comprising layers of (a) microfibrous non-woven material, (b) knitted fabric, (c) foamed plastic material, and (d) knitted fabric, in the order given.
- 35 10. A composite article according to claim 1, comprising layers of (a) microfibrous non-woven material, (b) cloth, (c) foamed plastic material and

(d) cloth, in the order given.

11. A composite article according to claim 1,  
comprising layers of (a) microfibrous non-woven  
material, (b) cloth, (c) foamed plastic material and  
5 (d) knitted fabric, and the order given.

12. A composite article according to any of  
claims 7, 10 and 11, wherein the cloth is a cotton  
cloth, a polyester cloth, a nylon cloth or a mixed  
cloth.

10 13. A composite article according to any of  
claims 1 to 12, wherein the microfibrous non-woven  
material is perforated, sewn, shorn, printed or  
embossed.

14. A composite article according to any of  
15 claims 1 to 13, wherein one or more of the components  
thereof has flame-retardant characteristics.

15. A composite article according to claim 1,  
substantially as described in any of the foregoing  
Examples.

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